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HRSA Care*ACTION*

PROVIDING HIV/AIDS CARE IN A CHANGING ENVIRONMENT

HEPATITIS C

Introduction

Those unfamiliar with the hepatitis C virus (HCV) may wonder why this topic is receiving so much attention in an HIV/AIDS publication. The reason is HIV/HCV co-infection. The most conservative estimate of the HCV infection rate among HIV-positive individuals is 14 percent—between 91,000 and 126,000 individuals based on HIV/AIDS prevalence of 650,000 to 900,000 (Cohen, 1999). The co-infection rate is much higher among injection drug users.

HCV is the most prevalent blood-borne disease in the United States, where the number of infections likely exceeds 4 million. Approximately 85 percent of HCV-positive individuals develop chronic HCV infection, 70 percent develop chronic liver disease, and 10 to 20 percent develop cirrhosis. From 8,000 to 10,000 persons die from HCV every year in the United States alone (CDC, 1999).

There is no vaccination or cure for HCV. Treatment is expensive, and only successful in a minority of patients. Like HIV, HCV now strikes disproportionately among the poor and uninsured. A majority of new infections occur through injection drug use. Sexual transmission of HCV also occurs and is associated with a high number of sexual partners and sexual activity without a condom.

Neither HCV nor HIV/HCV interaction is well understood. Many people are unaware they are HCV-positive because they can remain asymptomatic for 20 years or more. When chronic hepatitis C is diagnosed, it is often at an advanced stage and, consequently, data on the early stages of infection are limited. Even less information on disease progression in co-infected patients is available, yet clinicians increasingly are required to treat both infections.

Forty percent of chronic liver disease—the 10th leading cause of death in the United States—is HCV-related, and HCV is the leading indicator for liver transplants in the country.

The Virus

The hepatitis C virus is small, even for a virus: at 50 nanometers in diameter, 200,000 hepatitis C viruses end to end would measure a single centimeter in length. Like HIV, HCV has RNA rather than DNA at its core. RNA molecules tend to make frequent mistakes when replicating and have poor "proofreading" capabilities; since errors are not corrected the virus mutates rapidly (Koop, 1998). A high mutation rate is an effective strategy for evading the human immune system and therapy, and makes development of a vaccine extremely difficult.

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Natural History

Acute Infection

Only 30 to 40 percent of individuals newly infected with HCV exhibit symptoms of acute infection; these symptoms occur anywhere from 3 to 20 weeks after exposure (Hoofnagle, 1997; CDC, 1998). They often are mild and intermittent and include fatigue, nausea, muscle and joint pain, poor appetite and right upper quadrant tenderness or discomfort (NIDDK, 1999). Twenty to 30 percent of those infected may have jaundice, a condition typically associated with liver disease (CDC,1998). Illness associated with acute hepatitis C, when it appears at all, lasts from 2 to 12 weeks. Fulminate hepatitis (severe and rapid progression of liver disease) resulting from HCV is rare (Hoofnagle, 1997).

HCV produces approximately 10 trillion hepatitis virions daily (Sulkowski). The HIV replication rate is slower — approximately 10 billion virions daily.

Other markers for hepatitis C appear earlier than the onset of symptoms. HCV RNA can be detected in the blood as early as 1 to 3 weeks after exposure. Levels of the liver enzyme alanine aminotransferase (ALT) may begin to rise after several weeks—although even among the chronically infected, ALT levels are not always elevated. Antibodies to the virus appear somewhat later than HCV RNA in the blood: in 80 percent of patients within 15 weeks of exposure; ≥ 90 percent within 5 months; and ≥ 97 percent by 6 months (CDC, 1998).

Chronic Infection

Virtually all infected persons develop liver cell damage within an average of 50 days of infection and chronic infection develops in up to 85 percent of those who contract the virus; for reasons not well understood, the remaining individuals eradicate the virus without treatment (NIH Consensus, 1997; CDC, 1998). Infection may not be apparent for decades, but the virus is not dormant. Cirrhosis of the liver develops in 10 to 20 percent of HCV-infected individuals, usually slowly—over a period of 20 to 30 years. Liver cancer may develop in up to 5 percent of individuals infected with HCV (CDC, 1998).

In 1 to 2 percent of HCV-infected individuals, extrahepatic (non liver-related) complications may appear. These include cryoglobulinemia, membranoproliferative glomerulonephritis and porphyria cutanea tarda (CDC, 1999).

Epidemiology

The long asymptomatic period of HCV, inadequate HCV screening, and lack of access to health care for populations among whom incidence is highest are just three of the issues that make estimating HCV prevalence extremely difficult.

The largest HCV prevalence study estimated 3.9 million HCV-positive individuals in 1994, of whom 2.7 million were chronically infected. HCV was most prevalent in the 30 to 49 - year-old age group. Among Blacks the rate was 6 to 7 percent, and it was higher among Black men (9 to 10 percent)—compared to 1.8 percent in the population as a whole. As indicated by the study's authors, this estimate was conservative because it excluded populations among whom prevalence is known to be high; e.g., incarcerated and homeless individuals (Alter et al., 1999).

HCV prevalence in the United States is increasing—incidence is greater than mortality—however, incidence has declined dramatically from an estimated average of 242,000 from 1985 through 1990 (CDC, 1999). Today, incidence is estimated at between 35,000 and 40,000. This decline is largely due to the virtual elimination of transmission through tainted blood products. Transmission among injection drug users has also decreased, but much less significantly. Most new infections occur in individuals ages 20 to 39 years. Incidence is similar among White and Black Americans, and is slightly higher among Hispanics .

Mortality

Between 8,000 and 10,000 Americans die annually from hepatitis C. Without substantial improvement in treatment options, that number will increase over the next decade: large numbers were infected with HCV 20 to 25 years ago and are approaching the stage of infection at which severe complications typically become apparent.

Transmission

Hepatitis C virus is a blood-borne disease, and transmission can occur in a number of ways.

Injection Drug Use

Injection drug use (IDU) has been the leading risk factor for HCV in the United States since the onset of the epidemic. Hepatitis C is easily blood borne—much more so than HIV—and is a prime candidate for transmission through shared contaminated syringes.

The prevalence of hepatitis C among IDUs is extremely high—more than 90 percent in some samples. This means that the likelihood of coming into contact with contaminated blood is quite significant, and that there is a real risk of infection in those who ever injected drugs—even once.

One of the startling facts about hepatitis C is the rapidity with which IDUs contract the virus. In one study of 1,356 IDUs in which 88.7 percent of participants were HCV positive, prevalence was as follows:

HCV Infection Among 1,356 IDUs	
Duration of injection drug use	*Percent who were HCV positive*
< 1 year	*54 percent*
1 year	*78 percent*
> 5 years	*83 percent*
≥ 10 years	*94 percent*

The 405 HIV positive participants in the study were more likely to be HCV positive than HIV negative participants—93.4 percent compared to 86.7 percent. Even among participants who did not report sharing needles, prevalence was 82.9 percent compared to 91.9 percent in those who acknowledged needle-sharing behaviors (Thomas, 1995). This points to the potential importance of indirect sharing—like "front and back loading" (dividing drugs by sticking one syringe into another) (Coutinho, 1998).

Other Drug Use

Although documentation is limited, HCV infection may be associated with a history of intranasal cocaine use (CDC, 1998). The speculation is that delicate nasal membranes are broken during intranasal drug use and shared straws are contaminated with infected blood. If transmission does occur through this method, it appears to do so rarely.

Transfusions and Transplants

Tainted blood products were once a significant source of HCV infection, but transmission of the virus in this manner is now very rare. It is estimated that the likelihood of acquiring HCV from transfusions is only .001 percent per unit transfused (CDC, 1998).

Sexual Transmission

Sexual transmission of HCV occurs, but the level of risk through sexual exposure remains unclear. In some studies, HCV infection has been associated with individuals reporting a greater number of sexual partners, a history of STDs, and no condom use; the risk of sexual transmission rises substantially in the presence of two or more of these risk factors.

From 15 to 20 percent of patients with chronic HCV in CDC's Sentinel Counties Surveillance System have a history of sexual exposure, with no other known risk factors. In contrast, studies of long-term HCV negative spouses of HCV positive individuals consistently reveal low seroconversion rates —an average of only 1.5 percent—which calls into question the level of risk from sexual contact (CDC, 1998). Moreover, a study of individuals seeking care at STD clinics revealed seroconversion rates virtually equal (7 and 8 percent) among heterosexual men, regardless of whether their primary sexual partner was HCV positive or negative. Finally, only one study has indicated disproportionate risk for men who have sex with men (MSM), and prevalence among MSM and heterosexuals treated at STD clinics is virtually equal; these results are perplexing since transmission of blood-borne disease is thought to be more efficient among MSM than through heterosexual contact. According to the CDC:

It currently is estimated that up to 60 percent of new infections occur through injection drug use; up to 20 percent through sexual contact; and up to 10 percent through occupational, household, perinatal, and hemodialysis exposure combined.

> *". . . this result, and the low prevalence of HCV infection observed among long-term spouses of persons with chronic HCV infection, have raised doubts regarding the importance of sexual activity in transmission of HCV. Unacknowledged percutaneous risk factors (i.e., illegal injection drug use) might contribute to increased risk for HCV infection among persons with high-risk sexual practices."*

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Vertical Transmission

The rate of HCV transmission from an HCV-infected mother to her newborn is about 5 to 6 percent. However, if the mother is co-infected with HIV, the vertical transmission rate jumps to between 14 and 17 percent (CDC, 1998).

Nosocomial Transmission

Nosocomial transmission (infection of patients through contaminated medical equipment) is uncommon in the United States, but has been reported in chronic hemodialysis settings.

Occupational Exposure

It is possible for health care workers to acquire HCV through needle sticks, but the prevalence in health care workers is about the same as that in the general population. The range of "needle stick conversion rates" is 0 to 7 percent, depending on the risk factors of the individual in whom the needle was originally used (Sherman, 1999).

Household Contact

Infection from household contact is probably extremely uncommon. It has not been documented in the United States, although studies in Japan and Italy have shown that it does occur (Herrine, 1999).

Tattooing and body-piercing

There is no documentation of transmission during tattooing or body-piercing in the United States, although it has apparently occurred elsewhere in the world (Herrine, 1999).

HCV Testing

HCV can be diagnosed by detecting HCV antibodies in the blood. Two tests are FDA-approved for detection of HCV antibodies: the enzyme immuno assay, commonly referred to as EIA or ELISA; and the recombinant immuno blot assay (RIBA). Both detect HCV antibodies in ≥ 97 percent of infected patients.

The advantages of the EIA are ease of use and low cost. Disadvantages are: false positives occur more often than with the RIBA, the interval between infection and detection may be as long as 3 to 6 months, and people who are immuno-suppressed or immuno-compromised may not have detectable antibodies to HCV. The RIBA is more complex and considerably more expensive to administer but has higher specificity.

Because false positive, false negative, and indeterminate results occur, a second "confirmatory" assay is required to confirm a positive result, or a negative result in an individual thought to be positive. In some cases, a third may be required. Neither the EIA nor the RIBA indicates whether HCV infection is acute (new), chronic (long term) or resolved (past infection).

HCV appears to be more efficiently transmitted from males to females than from females to males.

Tests to directly detect hepatitis C RNA in the blood (viral load) are commonly available in clinical practice but are not yet standardized. The reverse transcript polymerase chain reaction (PCR) and branched DNA assay (bDNA) both detect the nucleic acid of the virus in the blood, and are indicators of active infection. The PCR test has high sensitivity and may be able to detect a very low level of virus in the blood as early as 1-2 weeks after infection. However, it is technically difficult to administer and false results are a common problem.

Until very recently, HCV diagnostic testing was available only in a physician's office or clinic. In June, the FDA approved an "at-home" test kit for hepatitis C. Individuals provide a small blood sample, which is sent to a laboratory for testing. Results are available in about 10 days.

Testing for HCV Antibodies in HIV-positive Patients

The EIA is especially prone to false negatives in HIV-positive patients, because they may not develop detectable levels of antibodies to the virus (Schiff, 1999). One study reported that HCV was undetected in 30 percent of HIV/HCV-positive patients, whereas false negatives for the general HCV population were in the range of 0.5 to 10 percent (Collier et al., 1998; Dieterich, 1999). The RIBA may be more likely to be indeterminate in co-infected individuals (Dieterich, 1999). In one study of patients known to have HCV viremia in the blood, 14.7 percent of RIBA results were negative or indeterminate in the HIV-positive group, while only 4 percent were indeterminate in the HIV-negative group and none were negative. (Cribier, 1995).

For a more complete discussion of HCV testing, see Morbidity and Mortality Weekly Report, CDC, Volume

Assessment of Liver Damage

HCV tests cannot assess liver damage. A liver enzyme, alanine aminotransferase (ALT), must be measured to determine if the liver is inflamed. Elevated ALT indicates active liver disease.

A single ALT reading will be insufficient, since ALT levels have a tendency to fluctuate over time. Sixty to 70 percent of chronically infected patients show either persistently or intermittently elevated ALT levels. In the remaining 30 to 40 percent, ALT levels are normal (CDC, 1998). In a study of 1,042 HCV-positive individuals, researchers conducted four or more ALT evaluations over a period of 25 months. Forty-two percent showed persistently normal values, 15 percent persistently elevated values, and 43 percent had intermittently elevated values (Inglesby et al., 1999).

Liver damage also may be assessed through a liver biopsy. It is used in conjunction with repeated measurement of ALT levels to determine the severity and activity of the disease, and the amount of fibrosis in the liver. It is recommended before treatment to both assess the status of the disease and to exclude other types of liver disease or complications.

Treatment

Alfa Interferon

Alfa interferon monotherapy was until recently the only approved treatment for HCV. It has been successful in a minority of patients. Successful therapy for HCV is defined biochemically as normalization of the liver enzyme alanine aminotransferase (ALT) and virologically as loss of serum HCV RNA (reduction in HCV viral load).

The duration of alfa interferon monotherapy is normally 24 weeks. Normalization of ALT levels occurs in 40-50 percent of subjects but is sustained in only 15-20 percent 6 months after end of treatment. When duration of treatment is increased to 48 weeks, biochemical sustained response improves to 20 to 30 percent. For patients who initially respond to treatment but who relapse after 6 months, response to a 12-month regimen is more favorable: biochemical end of treatment response in 75 to 85 percent and sustained response in 30 to 40 percent of subjects. Virologic response (change in viral load) is poorer: end of treatment improvement occurs in 30-40 percent of patients but is sustained in 0 to 20 percent (NIH Consensus, 1997).

Several factors have been associated with favorable response to treatment: relatively low serum HCV RNA levels (less that 1,000,000 copies/mL); absence of cirrhosis; and infection with HCV genotype 2 or 3. Unfortunately, 70 to 80 percent of individuals living with HCV in the United States are infected with HCV genotype 1, which is less responsive to interferon (NIH Consensus, 1997).

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Who should be tested for HCV?

- *Anyone who has ever injected illegal drugs, even if it was on a limited basis many years ago*
- *Anyone who has been notified that they received blood from a donor who later tested positive for hepatitis C*
- *Anyone who received a blood transfusion or solid organ transplant before July 1992*
- *Anyone who received a blood product for clotting problems produced before 1987*
- *Anyone who ever received long-term hemodialysis*
- *Anyone who has evidence of liver disease (i.e., abnormal ALT levels)*
- *Children born to HCV-positive women*

Source: CDC

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Interferon and Ribavirin

The FDA recently approved the combination of alfa interferon with ribavirin for the treatment of HCV. Originally used only in cases where patients had relapsed or not responded at all to interferon monotherapy, it is now used as an initial treatment as well. In one recent study, a sustained response was achieved in 43 percent of patients who received the interferon/ribavirin combination for 48 weeks (Poynard, 1998). In another study, 38 percent of patients who received the combination demonstrated a sustained response after 48 weeks of therapy, compared to 13 percent of those who had received interferon alone (NIH Consensus, 1997). A number of other studies show similar results. Ribavirin alone has not proven effect-ive in treating the hepatitis C virus.

70 to 80 percent of individuals living with HCV in the United States are infected with HCV genotype 1, which is less responsive to interferon than other strains.

Side Effects

Interferon and ribavirin are not without side effects. The major side effect associated with ribavirin is hemolytic anemia. The majority of patients treated with interferon suffer flu-like symptoms, which can include fever, chills, malaise, headache, myalgia and tachycardia, but these tend to diminish with continued treatment. Later side effects include fatigue, alopecia, bone marrow suppression, apathy, cognitive changes, irritability, and depression. Ten to 40 percent of patients under treatment require a reduction in interferon dosage due to side effects, and 5 to 10 percent must discontinue treatment. Severe side effects include autoimmune disease, depression with suicidal risk, seizure disorder, acute cardiac and renal failure, retinopathy, interstatial pulmonary fibrosis, hearing impairment, and sepsis effects. They occur in less than 2 percent of patients. Infrequently, a paradoxical worsening of liver disease with therapy occurs (NIH Consensus, 1997). Therefore, ALT levels must be monitored frequently.

Initiating Treatment

It is not always clear who to treat for HCV and when to initiate treatment. The course of the disease is variable and usually slow. CDC guidelines and the NIH Consensus Conference indicate that those patients most likely to progress to cirrhosis should be treated—those with persistently elevated ALT levels, detectable HCV RNA in the blood, and liver biopsy indicating portal or bridging fibrosis, or moderate degrees of inflammation and necrosis (CDC, 1998; NIH, 1997). New research confirms that treatment with interferon before serious symptoms develop reduces the incidence of liver cancer (Yoshida et al., 1999).

HIV/HCV Co-infection

The magnitude of HIV/HCV co-infection in the United States is not yet clearly defined. The most conservative estimates are that 14 percent of those living with HIV disease are HCV positive (Cohen, 1999). It is known that co-infection is much higher among some sectors of the HIV-positive population, particularly IDUs. For example, in Baltimore —where IDU is the HIV transmission route in over one-half of all new AIDS cases—50 percent of patients in one HIV clinic are co-infected with HCV (Sulkowski, 1999). In drug treatment facilities across the country, the HCV infection rate in HIV-positive patients often exceeds 50 percent.

Impact of HCV on HIV

Even if HCV had been more prevalent and better understood at the beginning of the AIDS epidemic, the immediacy and severity of HIV/AIDS would have precluded much concern over a disease in which severe symptoms may not develop for 20 years or more. Today, however, because HCV prevalence has increased substantially and HIV-positive individuals are living longer, clinicians are increasingly required to treat both diseases.

Research on the effect of HCV/HIV co-infection on HIV has produced mixed results. Some studies have found no significant impact on the progression of HIV (Haydon, 1998; Wright, 1994; Botarelli, 1993; Quan, 1993 in Dieterich). Others have shown that co-infected patients have increased risk for liver disease, faster progression of HIV disease, greater frequency of hospital admissions, and greater mortality (Lesens, 1998; Piroth, 1998).

There are indications that responsiveness to interferon in co-infected individuals is associated with CD4 counts but, in any case, is less than in HCV-positive/HIV-negative patients (Mauss in Ball 1997). While the combination of interferon and ribavirin has shown improved sustained response rates in those with hepatitis C infection, it has not yet been rigorously tested among HCV/HIV co-infected patients.

Impact of HIV on HCV

Higher incidence of cirrhosis of the liver occurs in co-infected patients, and develops in a shorter time period than in those patients who are infected with HCV alone. One study of IDUs found prevalence of cirrhosis was twice as high among HCV patients also living with HIV disease—30 percent, compared to 15.3 in HCV-positive/HIV-negative patients (Piroth, 1998). In a 1995 study, the incidence of cirrhosis among HCV patients was equal up to 10 years after infection, regardless of whether they were co-infected with HIV. After 15 years, the incidence diverged, with 25 percent of HCV/HIV-positive patients developing cirrhosis compared to only 6.5 percent of HCV-positive/HIV-negative patients (Sanchez-Qujano,1995; Soriano, 1999). In a more recent report, mean progression to cirrhosis in co-infected patients was 6.9 years, compared to 23.2 years in HCV-positive/HIV-negative patients (Soto, 1997 in Dieterich, 1999).

HCV replication appears to be enhanced when the immune system has been compromised by HIV (Beld, 1998; Thomas, 1995). One study found an inverse correlation between CD4 cell counts and HCV RNA levels, where CD4 counts were > 500 (Beld, 1998). Another study found that while HCV viremia in co-infected patients was higher than in HCV-positive/HIV-negative patients, there was no correlation between CD4 counts and HCV RNA (Cribier, 1995). All of these studies were conducted prior to the introduction of highly active antiretroviral therapy (HAART) for HIV disease.

Some research has shown that HAART may have an effect on the hepatitis C virus, but results are inconclusive. One relatively small study of co-infected patients being treated with protease inhibitors found a short-term increase in HCV viral load, but it had returned to baseline levels by 17 weeks (Rutschman in Ball, 1997). Preliminary results from another study showed that HAART was associated with a decrease in HCV titer (Pastor in Ball, 1997).

Although the incidence is low, treatment of co-infected patients with HAART may place additional strain on the liver, particularly if the treatment regimen includes the protease inhibitor, ritonavir (Piroth in Sulkowski, 1998; Orenstein in Sulkowski, 1998). This conclusion is consistent with research showing that liver cell damage occurs among approximately 10 percent of HIV-positive/HCV-negative patients on HAART, and that incidence is greatest among those treated with ritonavir (Sulkowski, 1998).

Conclusion

HCV prevalence is rising, and the HCV and HIV epidemics are increasingly intertwined, particularly among injection drug users. Consequently, decisions concerning treatment of HCV, and HCV and HIV in coinfected patients are confronting clinicians with greater frequency.

AIDS service organizations, community-based organizations, and Ryan White CARE Act grantees must grapple with the impact of HIV/HCV coinfection on the individuals they serve. They must also endeavor to clarify and deal with the implications of HIV/HCV coinfection for cost of care.

Clinicians, service providers, and health planners need to know more: more about HCV and its progression and more about HIV/HCV coinfection and treatment. Today, guidelines for treating co-infected patients are not yet specific, and therefore treatment will have to be addressed on an individual basis.

References for this article begin on page 11.

HIV Resistance Testing on Horizon

Genotypic and phenotypic tests for measuring resistance to antiretroviral therapy may become essential tools for making HIV treatment decisions. These new tests are important since response to therapy is compromised by drug-resistant strains of HIV. However, concerns abound regarding their accuracy, implications, and costs—from $250 to over $1,000.

Resistance to antiviral drugs is caused by mutations in the virus. HIV mutations develop quickly because of its rapid rate of replication. Accumulation of drug-resistant mutations is accelerated by sub-optimal treatment, non-adherence, and poor drug absorption.

Genotypic testing

A blood sample is analyzed to determine the presence of mutant virions known to be associated with resistance to certain drugs. Genotypic tests are appropriate only for patients on antiretroviral therapy whose viral load is above 1,000 copies. The test will not detect resistant virus when it comprises less than 20 percent of the total virus in the blood. Moreover, it is known that genotyping is not sensitive to at least one HIV mutation. Genotypic testing is less complex and less expensive (from $250 to $500 per test) than phenotypic testing and results are usually available within a few weeks.

Phenotypic testing

An HIV sample from the patient is subjected to drug combinations in the laboratory to determine the dosage levels required for inhibiting viral replication. When high dosage levels are required, resistance is thought to have developed. Like genotype testing, phenotyping will not detect the presence of mutant virions if they comprise less than 20 percent of the total HIV in the blood. Phenotyping is more complex and expensive than genotype testing—from $800 to over $1,000. However, because it tests the responsiveness of virus from the patient to drugs used in treatment, phenotypic testing offers a unique advantage over other methods.

Phenotype and genotype tests currently are not FDA-licensed for clinical use and may therefore not be covered by insurance. Little research has been conducted on the value of using resistance testing in improving treatment outcomes. However, although many questions remain regarding genotype and phenotype testing, their use in HIV care is likely to expand.

Additional information may be found in the following resources:

- *New Mexico AIDS InfoNet, HIV Resistance Testing Fact Sheet (#414) <http://www.aidsinfonet.org/414-resistance.html>*
- *Gay Men's Health Crisis' Treatment Issues, June 1998 <http://www.gmhc.org/aidslib/ti/ti.html>*
- *Project Inform: Descriptions of Genotypic and Phenotypic Resistance Tests <http://www. projinf.org/fs/GenoPheno.html>*
- *Johns Hopkins AIDS Service's Hopkins HIV Report, June 1999 <http://hopkins-aids.edu/publications/report/may99_1.html>*

Hepatitis C Websites

- *http://www.hepatitis-c.de/allhep.htm*
- *http://www.hepatitis.ca*
- *http://www.hepnet.com*
- *http://www.hivandhepatitis.com*
- *http://www.hepatitis-central.com*
- *http://www.thebody.com*
- *http://www.hepfi.org*
- *http://www.hepplace.com*
- *http://www.cdc.gov/ncidod/diseases/hepatitis*
- *http://sadieo.ucsf.edu/alf/alffinal/homepagealf.html*
- *http://hepatitis-central.com*

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HEPATITIS 101

Hepatitis is defined as an inflammation of the liver.

Non-viral forms of hepatitis can be caused by toxic agents (drugs or chemicals), alcohol, or autoimmune processes that cause a deterioration of the liver cells. Prolonged, repeated exposure to certain medications may also create hepatitis-like reactions. Other viruses can also cause hepatitis as a secondary effect. Additional forms of non-viral hepatitis include certain disorders such as Wilson's disease, hemochromatosis, and galactosemia as well as nonviral infections including syphilis and bacterial sepsis.

	Hepatitis A (HAV)	Hepatitis B (HBV)	Hepatitis C (HCV)	Hepatitis D (HDV)	Hepatitis E (HEV)
What is it?	HAV is a virus that causes inflammation of the liver. It does not lead to chronic disease.	HBV is a virus that causes inflammation of the liver. The virus can cause liver cell damage, leading to cirrhosis and cancer.	HCV is a virus that causes inflammation of the liver. This infection can lead to cirrhosis and cancer.	HDV is a virus that causes inflammation of the liver. It only infects those persons with HBV.	HEV is a virus that causes inflammation of the liver. It is rare in the U.S. There is no chronic state.
Incubation period	15 to 50 days. Average 30 days.	4 to 25 weeks. Average 8 to 12 weeks.	6 weeks to 6 months. Average 6 to 7 weeks.	4 to 26 weeks.	2 to 9 weeks. Average 40 days.
How is it spread?	Transmitted by fecal/oral route, through close person to person contact or ingestion of contaminated food and water.	Contact with infected blood, seminal fluid, and vaginal secretions. Sexual contact. Contaminated injection drug needles, razors, unsafe tattoo/body piercing and other sharp instruments. Infected mother to newborn. Human bite.	Contaminated injection drug needles. Transfusion and transplant recipients before July 1992. Received treatment with blood product before 1987. Long-term kidney dialysis. Multiple sex partners and/or sex with HCV infected person. Infected mother to newborn. Contaminated tattoo/body piercing equipment, house-hold objects (i.e. razors), or any other sharp instruments.	Infects people who already have HBV. Contact with infected blood, contaminated injection drug needles. Sexual contact with HDV-infected person.	Transmitted through the feces of an infected person. Very uncommon in the United States.

	Hepatitis A (HAV)	Hepatitis B (HBV)	Hepatitis C (HCV)	Hepatitis D (HDV)	Hepatitis E (HEV)
Symptoms	May have no symptoms. Adults may have light stools, dark urine, fatigue, fever and jaundice.	May have no symptoms. Some persons have joint pain, mild flu-like symptoms, dark urine, light stools, jaundice, fatigue and fever.	Same as HBV.	Same as HBV.	Same as HBV.
Treatment of chronic disease	Not applicable.	Interferon is effective in up to 35-45% of those treated. Epivir may also be effective.	Interferon is effective in 20% of those treated. The FDA recently approved Rebetron, which is a combined therapy of Interferon and Ribavirin, for treatment of hepatitis C.	Interferon with varying success.	Not applicable.
Vaccine	Two doses of vaccine to anyone 2 years of age or older.	Three doses may be given to persons of any age.	None. Become vaccinated for Hepatitis A and B.	Hepatitis B vaccination prevents HDV infection.	None.
Who is at risk?	Anyone with household or sexual contact with an infected person. Living in an area with HAV outbreak. Travelers to developing countries. Men who have sex with men. Injection drug users.	Infant born to infected mother. Having sex with infected person or multiple partners. Injection drug users. Emergency responders and healthcare workers. Men who have sex with men. Hemodialysis patients.	Anyone who had a solid organ transplant or blood transfusion before July 1992. Healthcare workers. Injection drug users. Hemodialysis patients. Infants born to infected mother. Multiple sex partners or history of STD.	Infection drug users. Men who have sex with men. Those having sex with an HDV-infected person. Only persons who have or had hepatitis B can be infected with hepatitis D.	Travelers to developing countries.
Prevention	Immune globulin or vaccination. Wash hands after going to the bathroom. Clean surfaces contaminated with feces, such as changing tables.	Vaccination and safer sex. Clean up any infected blood with bleach and wear protected gloves. Do not share razors or toothbrushes.	Clean up spilled blood with bleach. Wear gloves when touching blood. Do not share razors or toothbrushes. Do not use or share injection drug works. Safer sex (i.e., reducing number of partners, using barrier precautions, etc.)	Hepatitis B vaccine to prevent HBV infection. Safer sex.	Avoid drinking or using potentially contaminated water.

Source: Home Access Health Corporation